9.2 Understanding Interest – Overview

Definitions / Key Ideas

Interest – Amount charged for borrowing money or earned from investing

Principal - Initial investment or loan amount.

Annual Percentage Rate (APR) - Yearly interest rate (normally given as percentage per year).

Simple Interest – Only calculated on the principal.

Compound Interest - Calculated on principal and accrued interest.

Continuously Compounded Interest – Interest is compounded continuously.

Annual Percentage Yield (APY) – Effective annual interest rate (accounts for compounding).

(n values)

Table 1: Compounding Intervals

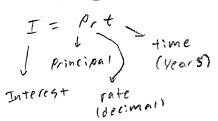
Compounding	Number per Year
Annually	1
Semiannually	2
Quarterly	4
Monthly	12
Weekly	52

365

Daily

Formulas and Examples

1. Simple Interest



Compound Interest (regular)

3. Compound Interest (continuous)

How much interest will I earn if...

Ex: I invest \$500 at 10% APR with simple interest for 8 years? For 6 months?

$$T = \begin{cases} 500 & (0.10) & 8 \\ 1 = 500 & (0.10) & (\frac{6}{12}) \end{cases}$$

$$V = \begin{cases} 9 & (0.10) & (\frac{6}{12}) \\ 1 = 500 & (0.10) & (\frac{6}{12}) \end{cases}$$

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A =
$$P(1 + \frac{C}{n})^n t$$

A = $Soo(1 + \frac{0.10}{13})^{13/8}$

T = $A - P$

but change to future value f of compounding f = f =

Ex: I invest \$500 at 10% APR for 8 years with continuous compounding?

A:
$$500e^{0.10(8)}$$
 $I = A - P$
 $\downarrow \approx $1112.77 - 500$
 $\downarrow = 612.77 in interest

4. Annual Percentage Yield

Ex: What is the Annual Percentage Yield (APY) for example 2? Monthly

Examples

Example 1: Suppose you wish to borrow \$200 for five weeks and the amount of interest you must pay is \$20 per \$100 borrowed. What is the APR at which you are borrowing money?

$$T = \frac{9.70}{100} \implies 840 \text{ for $9.00 bossowed}$$

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$$Q = 4000$$

$$Q = \frac{1}{5} \times \frac{1}{5} = r \times \frac{5}{52} \times \frac{1}{5}$$

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Example 2: Suppose that \$13,000 is deposited for eight years at 4% APR. Calculate the interest earned if interest is compounded weekly. Round your answer to the nearest cent.

4 Compound interest

A =
$$13.000 (1 + \frac{0.04}{52})^{52}(8)$$
 $A = 72$
 $A = 13.000 (1 + \frac{0.04}{52})^{52}(8)$
 $A = 72$
 A

$$7 = 13.000(1 + \frac{0.04}{50}) = 13.000(1 + \frac{0.04}{50}) = 17.898.74 - 13.000$$

$$= 13.000(1 + 0.000769) = 17.898.74$$

$$= 17.898.74$$
(\$1:\$htty different than previous answer due to rounding)